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JUL 16 1964

CURRENT SERIAL RECORDS

WATER SUPPLY OUTLOOK
and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS
for
ARIZONA

UNITED STATES DEPARTMENT of AGRICULTURE...SOIL CONSERVATION SERVICE,
SALT RIVER VALLEY WATER USERS ASSOCIATION
and
ARIZONA AGRICULTURAL EXPERIMENT STATION

Data included in this report were obtained by the agencies
named above in cooperation with the Federal, State and pri-
vate organizations listed on the last page of this report.

||||||| AS OF |||||
MAR. 1, 1964

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

To Recipients of Water Supply Outlook Reports:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from advance estimates of the streamflow.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, up to 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1400 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

Streamflow forecasts are obtained by a comparison of total or maximum snow accumulation, as measured by snow water equivalent, to the subsequent spring and summer or snowmelt season runoff over a period of years. The snow water equivalent measured in selected snow courses provides most of the index to the streamflow forecast for the following season. More accurate forecasts are usually obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast procedure. Early season forecasts assume average climatic conditions through the snowmelt season.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions. Soil Conservation Service Reports may be secured from Water Supply Forecasting Unit, Soil Conservation Service, P.O. Box 2807, Portland, Oregon 97208.

PUBLISHED BY SOIL CONSERVATION SERVICE

<u>REPORTS</u>	<u>ISSUED</u>	<u>LOCATION</u>	<u>COOPERATING WITH</u>
RIVER BASINS			
WESTERN UNITED STATES	MONTHLY (FEB.-MAY)	PORTLAND, OREGON	ALL COOPERATORS
BASIC DATA SUMMARY	OCTOBER 1	PORTLAND, OREGON	ALL COOPERATORS
STATES			
ALASKA	MONTHLY (MAR.-MAY)	PALMER, ALASKA	ALASKA S.C.D.
ARIZONA	SEMI-MONTHLY (JAN. 15 - APR. 1)	PHOENIX, ARIZONA	SALT R. VALLEY WATER USERS ASSOC. ARIZ. AGR. EXP. STATION
COLORADO AND NEW MEXICO	MONTHLY (FEB.-MAY)	FORT COLLINS, COLORADO	COLO. STATE UNIVERSITY COLO. STATE ENGINEER N. MEX. STATE ENGINEER
IDAHO	MONTHLY (JAN.-JUNE)	BOISE, IDAHO	IDAHO STATE RECLAMATION ENGINEER
MONTANA	MONTHLY (JAN.-JUNE)	BOZEMAN, MONTANA	MONT. AGR. EXP. STATION
NEVADA	MONTHLY (JAN.-MAY)	RENO, NEVADA	NEVADA DEPT. OF CONSERVATION AND NATURAL RESOURCES - DIVISION OF WATER RESOURCES
OREGON	MONTHLY (JAN.-JUNE)	PORTLAND, OREGON	OREG. STATE UNIVERSITY OREGON STATE ENGINEER
UTAH	MONTHLY (JAN.-JUNE)	SALT LAKE CITY, UTAH	UTAH STATE ENGINEER
WASHINGTON	MONTHLY (FEB.-JUNE)	SPOKANE, WASHINGTON	WN. STATE DEPT. OF CONSERVATION
WYOMING	MONTHLY (FEB.-JUNE)	CASPER, WYOMING	WYOMING STATE ENGINEER

PUBLISHED BY OTHER AGENCIES

<u>REPORTS</u>	<u>ISSUED</u>	<u>AGENCY</u>
BRITISH COLUMBIA	MONTHLY (FEB.-JUNE)	WATER RESOURCES SERVICE, DEPT. OF LANDS, FOREST AND WATER RESOURCES, PARLIAMENT BLDG., VICTORIA, B.C., CANADA
CALIFORNIA	MONTHLY (FEB.-MAY)	CALIF. DEPT. OF WATER RESOURCES, P.O. BOX 388, SACRAMENTO, CALIF.

WATER SUPPLY OUTLOOK
and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS
for
ARIZONA

(Salt, Verde, Gila and Part of Lower Colorado River Basin)

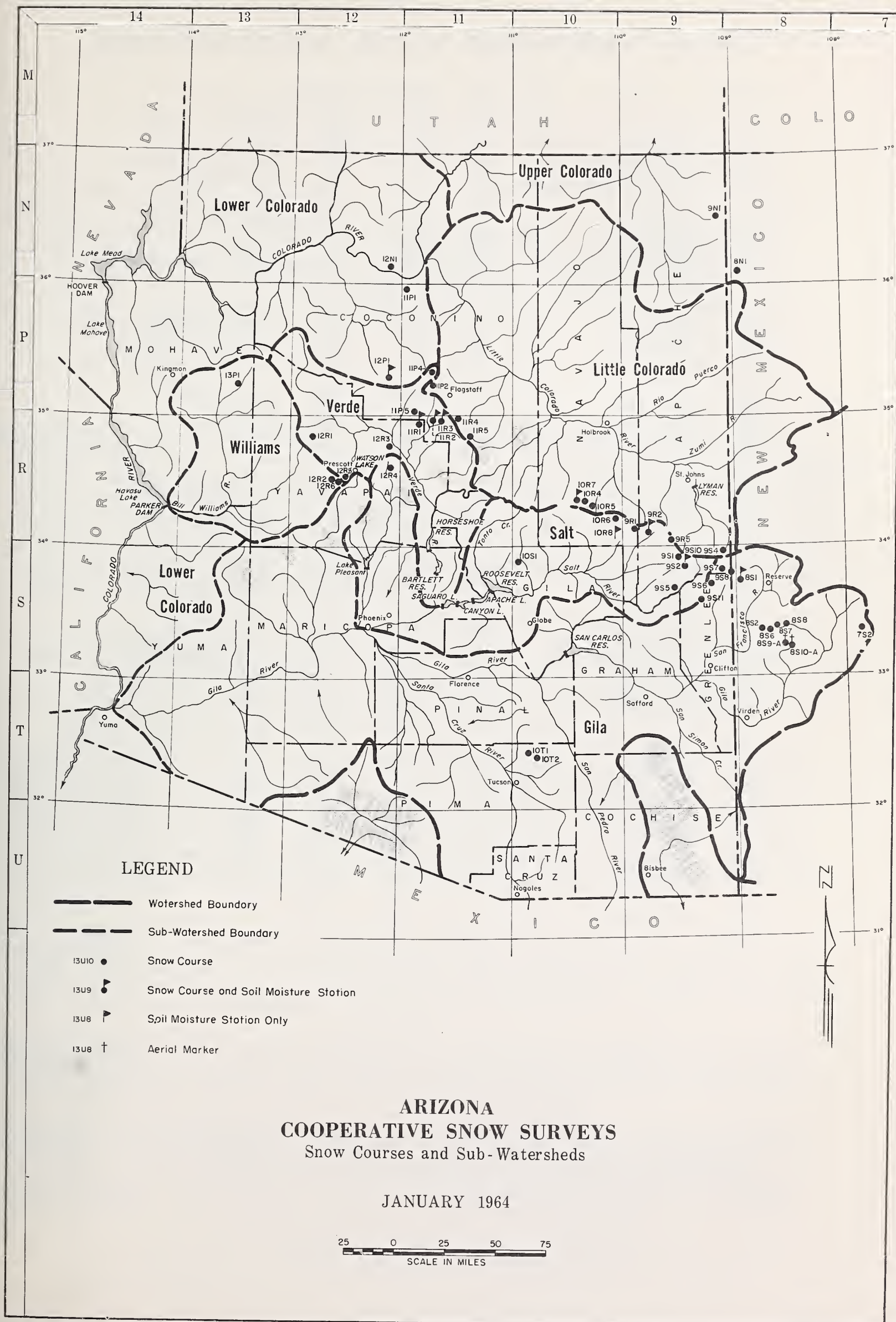
Report prepared by

RICHARD W. ENZ...SNOW SURVEY SUPERVISOR
SOIL CONSERVATION SERVICE
ROOM 6029 FEDERAL BUILDING
PHOENIX, ARIZONA 85025

Issued by

ROBERT V. BOYLE
STATE CONSERVATIONIST
SOIL CONSERVATION SERVICE

VICTOR I. CORBELL
PRESIDENT
SALT RIVER VALLEY WATER USERS ASSOCIATION



INDEX to SNOW COURSES and SOIL MOISTURE STATIONS

NUMBER **	NAME	SEC	TWP	RGE ***	ELEVATION	RIVER BASIN
9S1	Baldy (p)	28	7N	27E	9125	Salt-Little Colorado
10T1	Bear Wallow	6	12S	16E	8100	Gila
9S6	Beaver Head	13	4N	30E	8000	Salt-San Francisco
9S10-*	Black River Divide	11	6N	27E	9100	Salt-Little Colorado
12N1	Bright Angel	34	33N	3E	8400	Lower Colorado
12R1	Camp Wood	3	16N	6W	5700	Verde-Bill Williams
10R7-M	Canyon Creek #2	18	11N	15E	7500	Salt-Little Colorado
11R2-M	Casner Park	19	18N	8E	6930	Verde
12P1-M	Chalender	27	22N	3E	7100	Verde
12R6	Copper Basin Divide (p)	23	13N	3W	6720	Verde-Bill Williams
10R8-*	Corduroy Creek	Lat. 34°07' N. Long. 110°08' W.			§ 6000	Salt
9S7	Coronado Trail	26	5N	30E	8000	Salt-San Francisco
10R6	Forest Dale	2	9N	21E	6430	Salt-Little Colorado
11P2	Fort Valley (p)	22	22N	6E	7350	Verde-Little Colorado
9R5	Ft. Apache	18	7N	27E	9160	Salt-Little Colorado
8S1-M	Frisco Divide	31	6S	20W****	8000	San Francisco-Gila
12R4	Gaddes Canyon	11	15N	2E	7600	Verde-Agua Fria
10R5	Gentry	36	11N	15E	7600	Salt
11P1	Grand Canyon	21	30N	4E	7500	Lower Colorado
9S11	Hannagan Meadows (p)	19	3N	29E	9090	Salt
11R5	Happy Jack	30	17N	9E	7630	Verde
10R4	Heber (p)	28	11N	15E	7600	Salt-Little Colorado
8S9-A	Hummingbird	19	11S	17E	10,550	San Francisco-Gila
8S6	Ice King	6	11S	18W****	8020	San Francisco-Gila
7S2	Inman	6	11S	10W****	7800	Gila
12R2	Iron Springs	22	14N	3W	6200	Verde-Bill Williams
9S2	Maverick Fork (p)	13	6N	27E	9050	Salt
9R2-M	McNary	14	8N	23E	7200	Salt-Little Colorado
9R1	Milk Ranch	28	8N	23E	7000	Salt
12R3	Mingus Mountain	3	15N	2E	7100	Verde-Agua Fria
8S2	Mogollon	2	11S	19W****	7000	San Francisco-Gila
11R4	Mormon Lake	13	18N	8E	7350	Verde-Little Colorado
11R3-M	Mormon Mountain (p)	14	18N	8E	7500	Verde
11R1-M	Munds Park	7	18N	7E	6500	Verde
11P5-M	Newman Park	25	19N	6E	6750	Verde
9S4	Nutriso	23	6N	30E	8500	San Francisco-Little Colorado
9S5	Pacheta	At Town of Maverick, Ariz.			§ 7800	Salt
8S7	Redstone Trail	5	11S	18W****	8600	San Francisco-Gila
10T2	Rose Canyon	15	12S	16E	7300	Gila
8S8	Silver Creek Divide	4	11S	18W****	9000	San Francisco
11P4	Snow Bowl (p)	36	23N	6E	10,260	Verde
9S8	State Line	6	6S	21W****	8000	Gila-San Francisco
12R5	White Spar	19	13N	2W	6000	Verde
8S10-A	Whitewater	19	11S	17E	10,750	Gila
13P1	Willow Ranch	16	21N	11W	5000	Bill Williams
10S1	Workman Creek	33	6N	14E	6900	Salt

* SOIL MOISTURE STATION ONLY

** NUMBER INDICATES LOCATION OF SNOW COURSE WITHIN COORDINATE RECTANGLE.
THUS 9N1 IS COURSE #1 IN COORDINATE RECTANGLE 9N.

*** ALL IN GILA AND SALT RIVER BASE AND MERIDIAN EXCEPT WHERE OTHERWISE INDICATED.

**** NEW MEXICO PRINCIPAL MERIDIAN

M SOIL MOISTURE STATION INSTALLED ON OR IN VICINITY OF SNOW COURSE.

§ UNSURVEYED

(p) STORAGE GAGE INSTALLED ON OR IN VICINITY OF SNOW COURSE.

A AERIAL SNOW DEPTH GAGE

ARIZONA WATER SUPPLY OUTLOOK

MARCH 1, 1964

* * * * *
*
* The Surface Water Supply Outlook varies from fair to poor in *
* the major irrigated areas in Arizona. Streamflow is forecast *
* to be between 20-50% of average. Reservoir storage is near *
* normal on the Salt River Project, but very low elsewhere with *
* minor exceptions. *
*
* * * * *

SNOW COVER: Snow fall during the past two weeks was again below normal. Slight increases of less than 1" of water were measured at the 9000' level in the White Mountains, and in the Heber Rim country. At the lower elevations, what little snow fell melted. Only one snow course on the Verde Watershed showed a slight increase since February 15. This is by far the driest area with only 14% of average being measured on March 1. Snow cover is somewhat better on the Salt, Gila, and Little Colorado Watersheds amounting to 33%, 30% and 39% of average respectively.

A storm is presently in progress. Ten inches of snow containing .76" of water has fallen at Flagstaff. Other stations are generally reporting 2"-8" of snow containing about 1/2" of water. The storm is accompanied by cold temperatures resulting in a snow line as low as 2000'. Tucson reported 5" of snow on the ground this morning (March 3).

RESERVOIR STORAGE: Storage in the Salt River Project Reservoirs is average for this date. A steady decline may be expected in the future, however, since outflow will exceed inflow. During February, storage in the Salt River Project Reservoirs declined 26,000 Acre Feet. Conditions are worse in San Carlos Reservoir and Lake Pleasant where present storage is about 60% of average. Only Lyman Reservoir and Watson Lake contain above normal storage.

SOIL MOISTURE: Mountain soils generally contain good moisture. Bright sunny days accompanied by several windy days is drying the surface of the soil. This is especially true at the lower elevations. Surface soils continue to be frozen at higher elevations.

PRECIPITATION: Below normal precipitation continued in February for the third consecutive month. The lowest precipitation occurred on the Verde Watershed where less than 10% of normal was received.

STREAMFLOW AND WATER SUPPLY: February runoff on the Salt and Verde Rivers amounted to only 23,000 Acre Feet; one-third of the 1943-57 average. Better runoff was received on the Gila River where two-thirds of average was recorded.

In spite of the recent storm, streamflow forecasts have again been lowered on the Verde, Tonto, and Salt Rivers. They are forecast to flow about one-quarter of average. Watershed conditions on the Gila Drainage remain unchanged, and forecasts have not been materially changed. Runoff should be about 50% of average there. The streamflow forecast on the Gila River near Solomon for the month of March is 11,000 Acre Feet, but should be at least 6000 Acre Feet even if watershed conditions get worse.

Surface Water Supplies on the Salt River Project will be about 80% of average for this irrigation season. This is based on what is now in storage, the spring runoff forecast, and the normal summer runoff.

Most areas of Arizona that depend on surface runoff will be somewhat short of water this year. Only St. Johns and Chino Valley have above average water supplies. Heavy supplemental pumping will be required on the Salt River Project, the San Carlos Project, and in the Upper Gila Valley. Careful water management by farmers will aid greatly to hold pumping to a minimum.

STREAM FLOW FORECASTS - MARCH 1, 1964

The following summarized runoff forecasts are based principally on mountain snow cover and on the assumption that precipitation and temperature will be near average from the present time to the end of the forecast period. Appreciable deviations from normal of temperature and/or precipitation will correspondingly modify these forecasts.

SUB-WATERSHED, STREAM and STATION	SEASONAL STREAM FLOW IN THOUSANDS OF ACRE FEET					
	FORECAST PERIOD: MARCH - MAY, INCLUSIVE					
	Forecast Runoff 1964	Percent 15-Year Average	Measured Runoff			1943-57 Average
			1963	1962	1961	
Salt River at Intake	54	27	120.2	417.0	65.1	200.4
Tonto River above Roosevelt	6	24	4.9	37.6	4.8	25.0
Verde River above Horseshoe	29	23	29.8	134.6	46.3	124.9
Gila River nr. Virden	14	51	25.6	62.7	12.9	27.6
Gila River near Solomon	26	50	50.1	124.0	17.7	52.3
Frisco River at Clifton	13	51	24.4	59.1	10.5	25.3
Little Colorado River above Lyman Dam (MARCH-JUNE, Incl.)	12	21	1.9	24.5	1.0	5.6
Gila River near Solomon (Month of March)	11	42	22.1	36.8	6.7	26.3

Gila River near Solomon is forecast to remain above 100 cfs until April 7.

The Granite Creek runoff forecast has been reduced. Unless unusual storms occur during March and April, Watson Lake will lack about 600 Acre Feet of reaching capacity.

STATUS OF ARIZONA RESERVOIR STORAGE - ABOUT MARCH 1, 1964

SUB- WATERSHED and/or STREAM	RESERVOIR	USABLE CAPACITY 1000s AC. FT.	USABLE STORAGE - 1000s ACRE FEET			
			1964	1963	1962	15-Year Average 1943-57
<u>GILA RIVER SUB-WATERSHED</u>						
Agua Fria	Lake Pleasant	163.8	16.0	2.8	14.8	24.9
Granite	Watson Lake	4.7	3.9	0.7	--	--
Gila	San Carlos	1,206.0	62.8	132.2	169.0	102.2
Verde	Bartlett	179.5	17.9	20.8	99.5	54.4
Verde	Horseshoe	142.8	1.5	1.4	33.7	16.8 *
Salt	Roosevelt	1,382.0	420.3	708.9	689.8	432.8
Salt	Apache	245.0	239.6	231.7	184.0	203.5
Salt	Canyon	58.0	55.2	53.4	53.3	42.4
Salt	Saguaro	70.0	65.0	66.5	66.7	38.5
<u>LOWER COLORADO RIVER SUB-WATERSHED</u>						
Colorado	Lake Havasu	619.4	536.4	518.6	532.6	559.2
Colorado	Lake Mohave	1,810.0	1,674.1	1,699.0	1,751.0	1,467.0*
Colorado	Lake Mead	27,207.0	15,090.0	22,496.0	18,246.0	16,929.0
Little Colo.	Lyman	30.6	10.5	13.5	3.6	6.3
Little Colo.	Show Low Lake	5.1	0.8	1.7	5.1	--

* Average is for less than 15 years of record in the 1943-57 period.

WATER SUPPLY INVENTORY
SALT RIVER VALLEY SYSTEM

MARCH 1, 1964

A C R E F E E T

3,000,000

2,500,000

2,000,000

1,500,000

AVERAGE SUPPLY ON MARCH 1

Average Summer
Runoff

Average Spring
Runoff

Average Storage

ANTICIPATED 1964 SUPPLY *

Average Summer
Runoff
Forecast Runoff
(March--May)

Present Storage

1,000,000

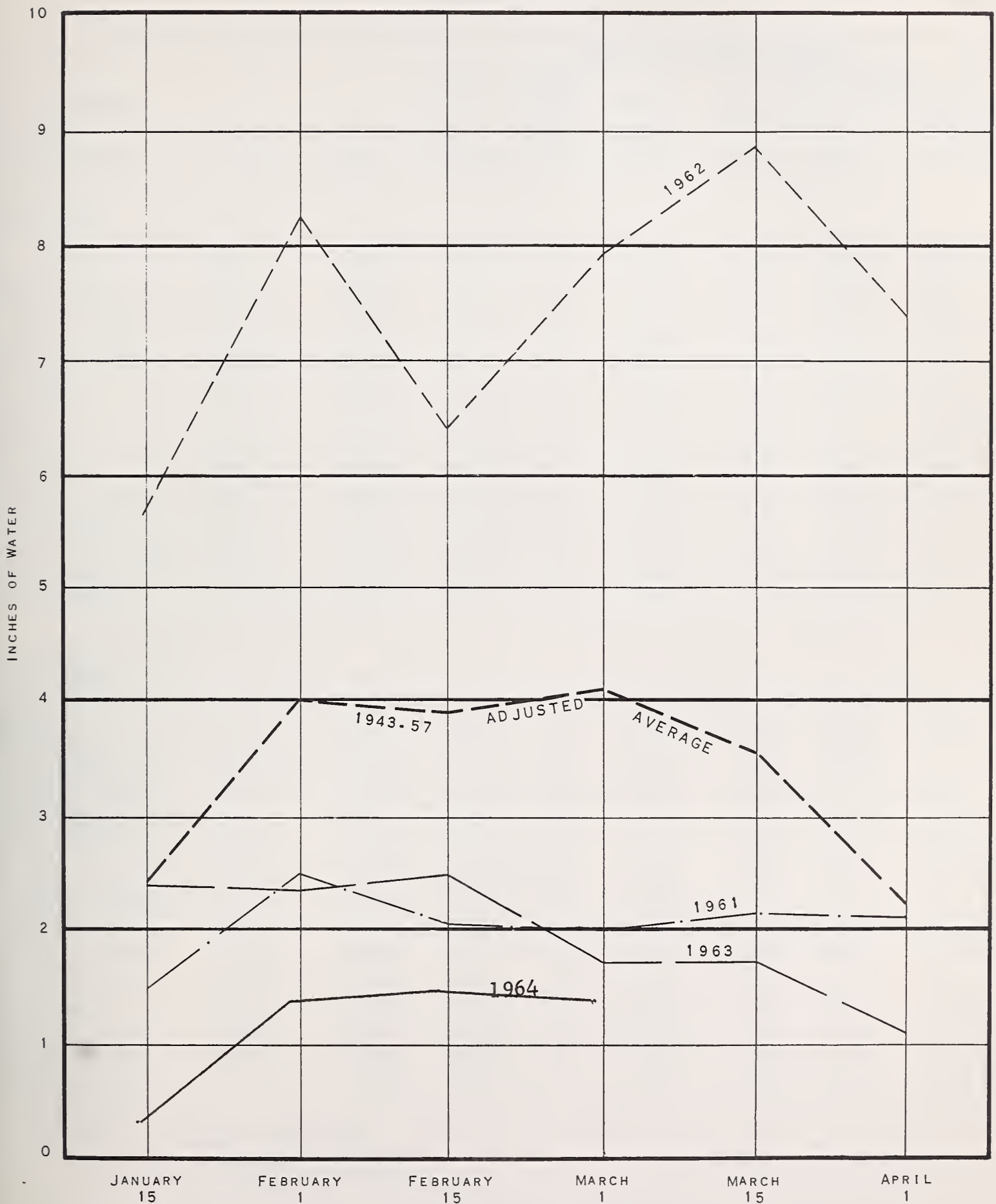
500,000

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* Based on present Storage + Forecast Spring runoff + Average Summer runoff.

RELATIVE SNOW WATER ACCUMULATION ARIZONA

MARCH 1, 1964



This graph represents the average snow water content on eleven selected snow courses on Arizona Sub-Watersheds.

1871

1871

ARIZONA SNOW SURVEYS - ABOUT MARCH 1, 1964

SUB-WATERSHED and SNOW COURSE			SNOW COVER MEASUREMENTS					
			1964			PAST RECORD		
			Date of Survey	Snow Depth (In.)	Water Content (In.)	Water Content (Inches) 1943-57 Average		
No.	Elev.					1963	1962	
<u>GILA RIVER</u>								
Bear Wallow	10T1	8100	2/28	2	0.3	2.9	13.0	2.4 **
Beaver Head	9S6	8000	2/29	2	0.4	0.7	5.8	2.3
Coronado Trail	9S7	8000	2/28	2	0.4	0.5	3.1	2.3
Frisco Divide	8S1-M	8000	2/28	3	0.8	0.3	2.3	1.7
Hummingbird <u>1/</u>	8S9-A	10550	3/1	42	6.7	---	---	---
Ice King	8S6	8020	2/28	13	3.4	7.2	11.3	---
Inman	7S2	7800	2/28	0	0.0	T	T	0.4 **
Mogollon	8S2	7000	2/28	2	1.1	2.9	5.1	1.4 **
Nutrioso	9S4	8500	2/28	4	0.7	0.4	2.1	1.7
Redstone Trail	8S7	8600	2/28	12	2.2	7.3	17.8	---
Rose Canyon	10T2	7300	2/28	0	0.0	0.9	8.4	0.8 **
Silver Creek Div.	8S8	9000	2/28	20	3.8	---	---	---
State Line	9S8	8000	2/28	4	0.6	0.2	2.5	2.1
Whitewater <u>1/</u>	8S10-A	10750	3/1	24	6.0	---	---	---
<u>SALT RIVER</u>								
Baldy *	9S1	9125	2/26	18	2.8	5.0	15.0	7.4 **
Beaver Head	9S6	8000	2/29	2	0.4	0.7	5.8	2.3
Canyon Creek #2	10R7-M	7500	2/26	14	2.4	0.0	6.8	---
Coronado Trail	9S7	8000	2/28	2	0.4	0.5	3.1	2.3
Forest Dale	10R6	6430	2/28	T	T	0.0	1.7	1.0
Ft. Apache *	9R5	9160	2/26	18	3.1	5.9	15.4	8.0 **
Gentry	10R5	7600	2/26	11	2.4	0.0	5.7	4.2 **
Hannagan Meadows	9S11	9090	2/29	19	4.0	---	---	---
Heber	10R4	7600	2/26	13	2.2	0.0	6.8	4.3 **
Maverick Fork	9S2	9050	2/26	21	3.4	6.0	18.4	9.0 **
McNary	9R2-M	7200	2/28	T	T	0.0	4.7	2.4
Milk Ranch	9R1	7000	2/28	0	0.0	0.0	2.5	0.9
Nutrioso *	9S4	8500	2/28	4	0.7	0.4	2.1	1.7
Pacheta	9S5	7800	2/28	0	0.0	1.4	8.0	2.6 **
Workman Creek	10S1	6900	2/26	10	3.1	2.5	12.6	3.4 **

* On Adjacent Drainage

** 1943-57 Adjusted Average

1/ Aerial observation: Water contents estimated.

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ARIZONA SNOW SURVEYS - ABOUT MARCH 1, 1964

SUB-WATERSHED and SNOW COURSE			SNOW COVER MEASUREMENTS					
			1964			PAST RECORD		
			Date of Survey	Snow Depth (In.)	Water Content (In.)	Water Content (Inches) 1943-57 Average		
No.	Elev.					1963	1962	
<u>VERDE RIVER</u>								
Camp Wood	12R1	5700	2/28	0	0.0	0.0	1.7	0.8 **
Casner Park	11R2-M	6930	2/25	0	0.0	T	8.1	2.8 **
Chalender	12P1-M	7100	2/28	5	1.0	0.0	6.4	2.8 **
Copper Basin Div.	12R6	6720	2/28	0	0.0	0.0	---	---
Fort Valley	11P2	7350	2/29	0	0.0	0.0	6.0	2.3 **
Gaddes Canyon	12R4	7600	2/28	4	0.6	2.3	10.6	---
Happy Jack	11R5	7630	2/29	0	0.0	0.3	9.3	3.8 **
Iron Springs *	12R2	6200	2/29	0	0.0	0.0	1.7	0.9 **
Mingus Mountain	12R3	7100	2/28	0	0.0	0.0	1.9	1.2 **
Mormon Lake *	11R4	7350	2/25	6	1.7	0.5	8.3	4.5 **
Mormon Mountain	11R3-M	7500	2/25	5	1.3	1.3	12.3	6.5 **
Munds Park	11R1-M	6500	2/25	0	0.0	0.0	4.4	2.4 **
Newman Park	11P5-M	6750	2/25	0	0.0	0.0	---	---
Snow Bowl	11P4	10260	2/26	12	2.3	0.0	17.1	---
White Spar	12R5	6000	2/28	0	0.0	0.0	---	---
<u>BILL WILLIAMS RIVER</u>								
Camp Wood *	12R1	5700	2/28	0	0.0	0.0	1.7	0.8 **
Copper Basin Div.	12R6	6720	2/28	0	0.0	0.0	---	---
Iron Springs	12R2	6200	2/29	0	0.0	0.0	1.7	0.9 **
Willow Ranch	13P1	5000	2/28	0	0.0	0.0	T	0.4 **
<u>LOWER COLORADO RIVER</u>								
Bright Angel	12N1	8400	No Survey		No Survey		9.5	9.4 **
Chalender *	12P1-M	7100	2/28	5	1.0	0.0	6.4	2.8 **
Fort Valley	11P2	7350	2/29	0	0.0	0.0	6.0	2.3 **
Grand Canyon	11P1	7500	2/28	0	0.0	0.0	3.7	2.0 **
<u>LITTLE COLORADO RIVER</u>								
Baldy	9S1	9125	2/26	18	2.8	5.0	15.0	7.4 **
Canyon Creek #2	10R7-M	7500	2/26	14	2.4	0.0	6.8	---
Forest Dale	10R6	6430	2/28	T	T	0.0	1.7	1.0
Ft. Apache	9R5	9160	2/26	18	3.1	5.9	15.4	8.0 **
Fort Valley	11P2	7350	2/29	0	0.0	0.0	6.0	2.3 **
Gentry	10R5	7600	2/26	11	2.4	0.0	5.7	4.2 **
Happy Jack *	11R5	7630	2/29	0	0.0	0.3	9.3	3.8 **
Heber	10R4	7600	2/26	13	2.2	0.0	6.8	4.3 **
McNary	9R2-M	7200	2/28	T	T	0.0	4.7	2.4
Mormon Lake	11R4	7350	2/25	6	1.7	0.5	8.3	4.5 **
Mormon Mountain	11R3-M	7500	2/25	5	1.3	1.3	12.3	6.5 **
Nutriso	9S4	8500	2/28	4	0.7	0.4	2.1	1.7
Snow Bowl	11P4	10260	2/26	12	2.3	0.0	17.1	---

* On Adjacent Drainage

** 1943-57 Adjusted Average

DELAYED REPORT RECEIVED SINCE LAST BULLETIN - FEBRUARY 15, 1964:

Happy Jack	11R5	7630	2/18	0	0.0
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ARIZONA SOIL MOISTURE - ABOUT MARCH 1, 1964

Drainage Basin and Station	<u>1/</u> Station Number	Elev.	Soil Profile <u>in Inches</u>		Date	Soil Moisture Content <u>in Inches--about MAR. 1</u>			
			Depth	Cap.		1964	1963	1962	Avg.
<u>GILA RIVER</u>									
Frisco Divide	8S1-M	8000	48	13.3	2/28	5.6	11.6	12.5	12.0
<u>SALT RIVER</u>									
Black River Divide	9S10-*	9100	48	16.8	2/26	10.7 [#]	11.6	12.4	11.0
Canyon Creek #2	10R7-M	7500	48	18.3	2/26	13.0	13.2	13.3	13.1
Corduroy Creek	10R8-*	6000	48	16.0	2/25	6.7	10.5	11.7	9.0
McNary	9R2-M	7200	48	16.3	2/25	6.9	11.2	8.3	9.2
<u>VERDE RIVER</u>									
Casner Park	11R2-M	6930	48	19.1	2/25	9.4 [#]	18.0	13.8	13.3
Mormon Mountain	11R3-M	7500	48	16.1	2/25	8.9 [#]	14.1	11.6	10.2

1/

- * - Soil Moisture Station only
- M - Snow Course and Soil Moisture Station
- # - First foot estimated -- ground frozen.

CORRECTION - LAST BULLETIN FEBRUARY 15, 1964:

McNary	9R2-M	7200	48	16.3	2/12	6.9
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LIST OF SNOW SURVEYORS

SNOW COURSE

SURVEYOR

Baldy -----	SCS and SRVWUA
Bear Wallow -----	Forest Service - Allan Hinds
Beaver Head -----	N. A. Josh
Bright Angel -----	National Park Service - Vern Ruesch
Camp Wood -----	Lyn Pehl
Canyon Creek #2 -----	SCS and SRVWUA
Casner Park -----	SCS and SRVWUA
Chalender -----	Forest Service - Mel Richards
Copper Basin Divide ---	SCS - Bill Gray
Coronado Trail -----	Forest Service - R.P. Julander & W.L. Sanders
Forest Dale -----	Fort Apache Reservation - Boyer & Endfield
Ft. Apache -----	SCS and SRVWUA
Fort Valley -----	Rocky Mountain Forest & Range Experiment Station
Frisco Divide -----	Forest Service - Joe Clayton
Gaddes Canyon -----	SCS - Bill Gray
Gentry -----	SCS and SRVWUA
Grand Canyon -----	National Park Service - Paul Mathis
Hannagan Meadows -----	N. A. Josh
Happy Jack -----	Emil O. Ryberg
Heber -----	SCS and SRVWUA
Hummingbird -----	Ray Freeman
Ice King -----	James R. Wray
Inman -----	C. H. McCauley
Iron Springs -----	Ernest Saxby
Maverick Fork -----	SCS and SRVWUA
McNary -----	Fort Apache Reservation - Boyer & Endfield
Milk Ranch -----	Fort Apache Reservation - Boyer & Endfield
Mingus Mountain -----	SCS - Bill Gray
Mogollon -----	James R. Wray
Mormon Lake -----	SCS and SRVWUA
Mormon Mountain -----	SCS and SRVWUA
Munds Park -----	SCS and SRVWUA
Newman Park -----	SCS and SRVWUA
Nutrioso -----	Forest Service - R.P. Julander & W.L. Sanders
Pacheta -----	Foch Phillips
Redstone Trail -----	James R. Wray
Rose Canyon -----	Forest Service - Allan Hinds
Silver Creek Divide ---	James R. Wray
Snow Bowl -----	Forest Service - Jay Shoemaker
State Line -----	Forest Service - Joe Clayton
White Spar -----	SCS - Bill Gray
Whitewater -----	Ray Freeman
Willow Ranch -----	Tiny Miller
Workman Creek -----	Rocky Mountain Forest & Range Experiment Station

The Following Organizations Cooperate in the Arizona Snow Survey Work

FEDERAL

Department of Agriculture

Soil Conservation Service

Forest Service

Apache Forest

Coconino Forest

Coronado Forest

Gila Forest

Kaibab Forest

Prescott Forest

Rocky Mountain Forest and Range Experiment Station

Tonto Forest

Department of Commerce

Weather Bureau

Arizona Section

Department of Interior

Bureau of Reclamation

Region III

Geological Survey

Arizona District

Bureau of Indian Affairs

Fort Apache Reservation

San Carlos Irrigation Project

National Park Service

Grand Canyon National Park

Gila Water Commissioner

Safford, Arizona

STATE

Arizona Agricultural Experiment Station

IRRIGATION PROJECTS

Salt River Valley Water Users' Association

Phoenix, Arizona

San Carlos Irrigation and Drainage District

Coolidge, Arizona

PRIVATE

Southwest Forest Industries, Inc.

McNary, Arizona

Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ROOM 16029 FEDERAL BUILDING
PHOENIX, ARIZONA 85025

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FEDERAL - STATE - PRIVATE
COOPERATIVE SNOW SURVEYS

Furnishes the basic data
necessary for forecasting
water supply for irrigation,
domestic and municipal water
supply, hydro-electric power
generation, navigation,
mining and industry

*"The Conservation of Water begins
with the Snow Survey"*

196
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JUL 15 1964

CURRENT SERIAL RECORDS

WATER SUPPLY OUTLOOK
and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS
for
ARIZONA

UNITED STATES DEPARTMENT of AGRICULTURE...SOIL CONSERVATION SERVICE,
SALT RIVER VALLEY WATER USERS ASSOCIATION
and
ARIZONA AGRICULTURAL EXPERIMENT STATION

Data included in this report were obtained by the agencies named above in cooperation with the Federal, State and private organizations listed on the last page of this report.

AS OF
MAR. 15, 1964

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

To Recipients of Water Supply Outlook Reports:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from advance estimates of the streamflow.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, up to 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1400 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

Streamflow forecasts are obtained by a comparison of total or maximum snow accumulation, as measured by snow water equivalent, to the subsequent spring and summer or snowmelt season runoff over a period of years. The snow water equivalent measured in selected snow courses provides most of the index to the streamflow forecast for the following season. More accurate forecasts are usually obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast procedure. Early season forecasts assume average climatic conditions through the snowmelt season.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions. Soil Conservation Service Reports may be secured from Water Supply Forecasting Unit, Soil Conservation Service, P.O. Box 2807, Portland, Oregon 97208.

PUBLISHED BY SOIL CONSERVATION SERVICE

<u>REPORTS</u>	<u>ISSUED</u>	<u>LOCATION</u>	<u>COOPERATING WITH</u>
RIVER BASINS			
WESTERN UNITED STATES _____	MONTHLY (FEB.-MAY) _____	PORTLAND, OREGON _____	ALL COOPERATORS
BASIC DATA SUMMARY _____	OCTOBER 1 _____	PORTLAND, OREGON _____	ALL COOPERATORS
STATES			
ALASKA _____	MONTHLY (MAR.-MAY) _____	PALMER, ALASKA _____	ALASKA S.C.D.
ARIZONA _____	SEMI-MONTHLY _____ (JAN.15 - APR.1)	PHOENIX, ARIZONA _____	SALT R. VALLEY WATER USERS ASSOC. ARIZ. AGR. EXP. STATION
COLORADO AND NEW MEXICO _____	MONTHLY (FEB.-MAY) _____	FORT COLLINS, COLORADO _____	COLO. STATE UNIVERSITY COLO. STATE ENGINEER N. MEX. STATE ENGINEER
IDAHO _____	MONTHLY (JAN.-JUNE) _____	BOISE, IDAHO _____	IDAHO STATE RECLAMATION ENGINEER
MONTANA _____	MONTHLY (JAN.-JUNE) _____	BOZEMAN, MONTANA _____	MONT. AGR. EXP. STATION
NEVADA _____	MONTHLY (JAN.-MAY) _____	RENO, NEVADA _____	NEVADA DEPT. OF CONSERVATION AND NATURAL RESOURCES - DIVISION OF WATER RESOURCES
OREGON _____	MONTHLY (JAN.-JUNE) _____	PORTLAND, OREGON _____	OREG. STATE UNIVERSITY OREGON STATE ENGINEER
UTAH _____	MONTHLY (JAN.-JUNE) _____	SALT LAKE CITY, UTAH _____	UTAH STATE ENGINEER
WASHINGTON _____	MONTHLY (FEB.-JUNE) _____	SPOKANE, WASHINGTON _____	WN. STATE DEPT. OF CONSERVATION
WYOMING _____	MONTHLY (FEB.-JUNE) _____	CASPER, WYOMING _____	WYOMING STATE ENGINEER

PUBLISHED BY OTHER AGENCIES

<u>REPORTS</u>	<u>ISSUED</u>	<u>AGENCY</u>
BRITISH COLUMBIA _____	MONTHLY (FEB.-JUNE) _____	WATER RESOURCES SERVICE, DEPT. OF LANDS, FOREST AND WATER RESOURCES, PARLIAMENT BLDG., VICTORIA, B.C., CANADA
CALIFORNIA _____	MONTHLY (FEB.-MAY) _____	CALIF. DEPT. OF WATER RESOURCES, P.O. BOX 388, SACRAMENTO, CALIF.

WATER SUPPLY OUTLOOK
and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS
for
ARIZONA

(Salt, Verde, Gila and Part of Lower Colorado River Basin)

Report prepared by

RICHARD W. ENZ...SNOW SURVEY SUPERVISOR
SOIL CONSERVATION SERVICE
ROOM 6029 FEDERAL BUILDING
PHOENIX, ARIZONA 85025

Issued by

ROBERT V. BOYLE
STATE CONSERVATIONIST
SOIL CONSERVATION SERVICE

VICTOR I. CORBELL
PRESIDENT
SALT RIVER VALLEY WATER USERS ASSOCIATION



INDEX to SNOW COURSES and SOIL MOISTURE STATIONS

NUMBER **	NAME	SEC	TWP	RGE ***	ELEVATION	RIVER BASIN
9S1	Baldy (p)	28	7N	27E	9125	Salt-Little Colorado
10T1	Bear Wallow	6	12S	16E	8100	Gila
9S6	Beaver Head	13	4N	30E	8000	Salt-San Francisco
9S10-*	Black River Divide	11	6N	27E	9100	Salt-Little Colorado
12N1	Bright Angel	34	33N	3E	8400	Lower Colorado
12R1	Camp Wood	3	16N	6W	5700	Verde-Bill Williams
10R7-M	Canyon Creek #2	18	11N	15E	7500	Salt-Little Colorado
11R2-M	Casner Park	19	18N	8E	6930	Verde
12P1-M	Chalender	27	22N	3E	7100	Verde
12R6	Copper Basin Divide (p)	23	13N	3W	6720	Verde-Bill Williams
10R8-*	Corduroy Creek	Lat. 34°07' N. Long. 110°08' W.			6000	Salt
9S7	Coronado Trail	26	5N	30E	8000	Salt-San Francisco
10R6	Forest Dale	2	9N	21E	6430	Salt-Little Colorado
11P2	Fort Valley (p)	22	22N	6E	7350	Verde-Little Colorado
9R5	Ft. Apache	18	7N	27E	9160	Salt-Little Colorado
8S1-M	Frisco Divide	31	6S	20W****	8000	San Francisco-Gila
12R4	Gaddes Canyon	11	15N	2E	7600	Verde-Agua Fria
10R5	Gentry	36	11N	15E	7600	Salt
11P1	Grand Canyon	21	30N	4E	7500	Lower Colorado
9S11	Hannagan Meadows (p)	19	3N	29E	9090	Salt
11R5	Happy Jack	30	17N	9E	7630	Verde
10R4	Heber (p)	28	11N	15E	7600	Salt-Little Colorado
8S9-A	Hummingbird	19	11S	17E	10,550	San Francisco-Gila
8S6	Ice King	6	11S	18W****	8020	San Francisco-Gila
7S2	Inman	6	11S	10W****	7800	Gila
12R2	Iron Springs	22	14N	3W	6200	Verde-Bill Williams
9S2	Maverick Fork (p)	13	6N	27E	9050	Salt
9R2-M	McNary	14	8N	23E	7200	Salt-Little Colorado
9R1	Milk Ranch	28	8N	23E	7000	Salt
12R3	Mingus Mountain	3	15N	2E	7100	Verde-Agua Fria
8S2	Mogollon	2	11S	19W****	7000	San Francisco-Gila
11R4	Mormon Lake	13	18N	8E	7350	Verde-Little Colorado
11R3-M	Mormon Mountain (p)	14	18N	8E	7500	Verde
11R1-M	Munds Park	7	18N	7E	6500	Verde
11P5-M	Newman Park	25	19N	6E	6750	Verde
9S4	Nutrioso	23	6N	30E	8500	San Francisco-Little Colorado
9S5	Pacheta	At Town of Maverick, Ariz.			7800	Salt
8S7	Redstone Trail	5	11S	18W****	8600	San Francisco-Gila
10T2	Rose Canyon	15	12S	16E	7300	Gila
8S8	Silver Creek Divide	4	11S	18W****	9000	San Francisco
11P4	Snow Bowl (p)	36	23N	6E	10,260	Verde
9S8	State Line	6	6S	21W****	8000	Gila-San Francisco
12R5	White Spar	19	13N	2W	6000	Verde
8S10-A	Whitewater	19	11S	17E	10,750	Gila
13P1	Willow Ranch	16	21N	11W	5000	Bill Williams
10S1	Workman Creek	33	6N	14E	6900	Salt

* SOIL MOISTURE STATION ONLY

** NUMBER INDICATES LOCATION OF SNOW COURSE WITHIN COORDINATE RECTANGLE.
THUS 9N1 IS COURSE #1 IN COORDINATE RECTANGLE 9N.

*** ALL IN GILA AND SALT RIVER BASIN AND MERIDIAN EXCEPT WHERE OTHERWISE INDICATED.

**** NEW MEXICO PRINCIPAL MERIDIAN

M SOIL MOISTURE STATION INSTALLED ON OR IN VICINITY OF SNOW COURSE.

§ UNSURVEYED

(p) STORAGE GAGE INSTALLED ON OR IN VICINITY OF SNOW COURSE.

A AERIAL SNOW DEPTH GAGE

ARIZONA WATER SUPPLY OUTLOOK

MARCH 15, 1964

* * * * *
* Streamflow forecasts vary from one-fifth to one-half of average. *
* Surface water supplies will be below average but adequate in most *
* cases. Many projects will have to rely heavily on pump water. *
* * * * *

SNOW COVER: The best storms of the winter occurred during the last two weeks. Better than average increases of snow pack were measured at the higher elevations. Many intermediate elevations also showed good increases. The snow pack is now 37%, 66%, and 40% of average, respectively, on the Verde, Salt, and Gila Watersheds. The best snow conditions are in the Rim country south of Heber where slightly above average snow was measured.

Hummingbird and Whitewater aerial markers were measured on the ground by conventional means this time, to determine accurately the water content of the snow pack. Although this is a new snow course and has no previous record, we believe the snow pack to be about 60% of normal.

RESERVOIR STORAGE: Storage in the Reservoirs serving central Arizona continues to decline. The Salt River Project Reservoirs now contain 94% of average and 38% of capacity. San Carlos Reservoir is down to 55% of average and 5% of capacity. Lyman Reservoir in Apache county, however, contains 167% of average and continues to rise. Watson Lake near Prescott is also above normal although no increase in storage has occurred for several months.

SOIL MOISTURE: At the lower elevations soil moisture increased slightly as a result of the recent storms. At the higher elevations surface soils continue to be frozen but contain near normal amounts of water.

PRECIPITATION: The Mormon Lake and White Mountain areas have received slightly above average precipitation the last two weeks. Prescott and Payson regions continued below average. For the period October through February, precipitation has been about 70% of normal in Arizona.

STREAMFLOW AND WATER SUPPLY: Forecasts have been raised slightly on the Salt and Verde Rivers, but lowered on the Gila River. Continued cold temperatures have resulted in low runoff from the recent storm. Snow at the lower elevations is melting slowly and infiltrating into the soil. There is very little evidence of runoff from snow so far. Snow in the higher elevations should cause a rise in the rivers in the next two weeks. Streamflow forecasts for the March through May period vary from 18% of average on Tonto Creek, to 47% on the Gila and San Francisco Rivers.

Combined flow of the Salt, Verde, and Tonto streams has been 796 Acre Feet less than the previous lowest for January and February since 1913.

Water supplies will be somewhat short in central Arizona and the Upper Gila Valley. Heavy pumping will be required in these areas. Water supplies for the projects below Lyman Reservoir and Watson Lake are above average.

Although water supplies will generally be adequate this year, there will be very little carry-over storage for next year. Severe shortages may be in prospect for 1965 if good runoff is not experienced next year.

STREAM FLOW FORECASTS - MARCH 15, 1964

The following summarized runoff forecasts are based principally on mountain snow cover and on the assumption that precipitation and temperature will be near average from the present time to the end of the forecast period. Appreciable deviations from normal of temperature and/or precipitation will correspondingly modify these forecasts.

SUB-WATERSHED, STREAM and STATION	SEASONAL STREAM FLOW IN THOUSANDS OF ACRE FEET					
	FORECAST PERIOD: MARCH - MAY, INCLUSIVE					
	Forecast Runoff 1964	Percent 15-Year Average	Measured Runoff			1943-57 Average
			1963	1962	1961	
Salt River at Intake	60	29	120.2	417.0	65.1	200.4
Tonto River above Roosevelt	4.5	18	4.9	37.6	4.8	25.0
Verde River above Horseshoe	33	26	29.8	134.6	46.3	124.9
Gila River nr. Virden	13	47	25.6	62.7	12.9	27.6
Gila River near Solomon	24	46	50.1	124.0	17.7	52.3
Frisco River at Clifton	12	47	24.4	59.1	10.5	25.3
Little Colorado River above Lyman Dam (MARCH-JUNE, Incl.)	1.2	21	1.9	24.5	1.0	5.6

Unless unusual storms occur during the remainder of March and April, Granite Creek is not expected to produce over 200 Acre Feet.

STATUS OF ARIZONA RESERVOIR STORAGE - ABOUT MARCH 15, 1964

SUB- WATERSHED and/or STREAM	RESERVOIR	USABLE CAPACITY 1000s AC. FT.	USABLE STORAGE - 1000s ACRE FEET			
			1964	1963	1962	15-Year Average 1943-57
GILA RIVER SUB-WATERSHED						
Agua Fria	Lake Pleasant	163.8	15.9	2.8	15.9	27.3
Granite	Watson Lake	4.7	3.9	0.7	--	--
Gila	San Carlos	1,206.0	59.4	128.3	163.9	108.0
Verde	Bartlett	179.5	22.3	24.7	95.7	67.3
Verde	Horseshoe	142.8	1.6	1.4	21.2	20.5*
Salt	Roosevelt	1,382.0	400.7	700.0	735.2	450.4
Salt	Apache	245.0	242.0	229.2	195.4	207.3
Salt	Canyon	58.0	55.5	53.8	54.6	44.3
Salt	Saguaro	70.0	65.8	65.2	66.5	44.5
LOWER COLORADO RIVER SUB-WATERSHED						
Colorado	Lake Havasu	619.4	537.3	532.3	552.2	566.1
Colorado	Lake Mohave	1,810.0	1,704.2	1,724.0	1,748.0	1,486.2*
Colorado	Lake Mead	27,207.0	14,846.0	22,256.0	18,122.0	16,686.0
Little Colo.	Lyman	30.6	10.7	13.5	4.4	6.4
Little Colo.	Show Low Lake	5.1	0.8	1.8	5.1	--

* Average is for less than 15 years of record in the 1943-57 period.

THE HISTORY OF THE

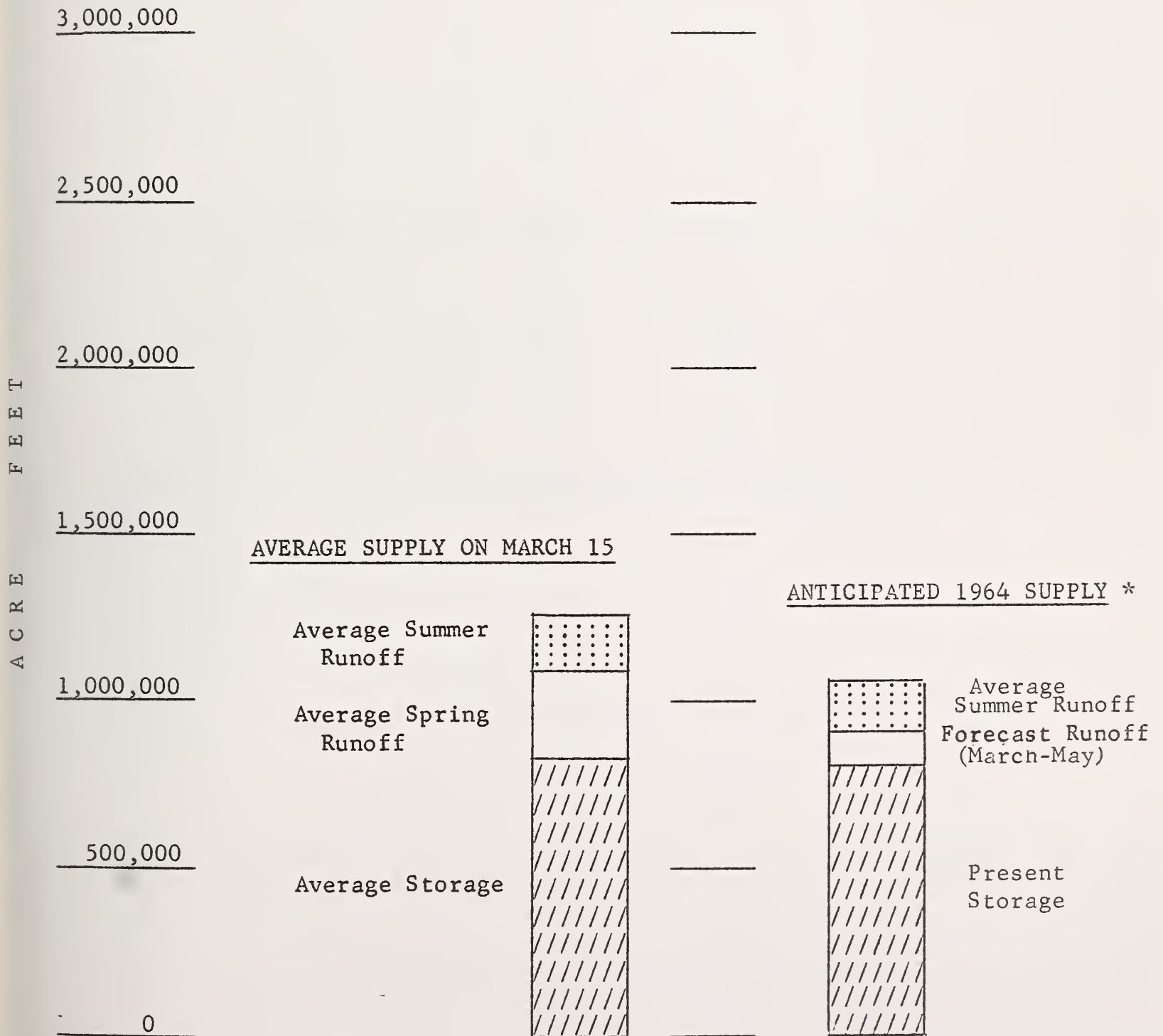
REIGN OF KING CHARLES THE FIRST

IN THE YEAR 1649

BY JOHN BURNET

THE DEEDS OF KING CHARLES THE FIRST					IN THE YEAR 1649
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799	800	801	802	803	804
805	806	807	808	809	810
811	812	813	814	815	816
817	818	819	820	821	822
823	824	825	826	827	828
829	830	831	832	833	834
835	836	837	838	839	840
841	842	843	844	845	846
847	848	849	850	851	852
853	854	855	856	857	858
859	860	861	862	863	864
865	866	867	868	869	870
871	872	873	874	875	876
877	878	879	880	881	882
883	884	885	886	887	888
889	890	891	892	893	894
895	896	897	898	899	900
901	902	903	904	905	906
907	908	909	910	911	912
913	914	915	916	917	918
919	920	921	922	923	924
925	926	927	928	929	930
931	932	933	934	935	936
937	938	939	940	941	942
943	944	945	946	947	948
949	950	951	952	953	954
955	956	957	958	959	960
961	962	963	964	965	966
967	968	969	970	971	972
973	974	975	976	977	978
979	980	981	982	983	984
985	986	987	988	989	990
991	992	993	994	995	996
997	998	999	1000	1001	1002
1003	1004	1005	1006	1007	1008
1009	1010	1011	1012	1013	1014
1015	1016	1017	1018	1019	1020
1021	1022	1023	1024	1025	1026
1027	1028	1029	1030	1031	1032
1033	1034	1035	1036	1037	1038
1039	1040	1041	1042	1043	1044
1045	1046	1047	1048	1049	1050
1051	1052	1053	1054	1055	1056
1057	1058	1059	1060	1061	1062
1063	1064	1065	1066	1067	1068
1069	1070	1071	1072	1073	1074
1075	1076	1077	1078	1079	1080
1081	1082	1083	1084	1085	1086
1087	1088	1089	1090	1091	1092
1093	1094	1095	1096	1097	1098
1099	1100	1101	1102	1103	1104
1105	1106	1107	1108	1109	1110
1111	1112	1113	1114	1115	1116
1117	1118	1119	1120	1121	1122
1123	1124	1125	1126	1127	1128
1129	1130	1131	1132	1133	1134
1135	1136	1137	1138	1139	1140
1141	1142	1143	1144	1145	1146
1147	1148	1149	1150	1151	1152
1153	1154	1155	1156	1157	1158
1159	1160	1161	1162	1163	1164
1165	1166	1167	1168	1169	1170
1171	1172	1173	1174	1175	1176
1177	1178	1179	1180	1181	1182
1183	1184	1185	1186	1187	1188
1189	1190	1191	1192	1193	1194
1195	1196	1197	1198	1199	1200
1201	1202	1203	1204	1205	1206
1207	1208	1209	1210	1211	1212
1213	1214	1215	1216	1217	1218
1219	1220	1221	1222	1223	1224
1225	1226	1227	1228	1229	1230
1231	1232	1233	1234	1235	1236
1237	1238	1239	1240	1241	1242
1243	1244	1245	1246	1247	1248
1249	1250	1251	1252	1253	1254
1255	1256	1257	1258	1259	1260
1261	1262	1263	1264	1265	1266
1267	1268	1269	1270	1271	1272
1273	1274	1275	1276	1277	1278
1279	1280	1281	1282	1283	1284
1285	1286	1287	1288	1289	1290
1291	1292	1293	1294	1295	1296
1297	1298	1299	1300	1301	1302
1303	1304	1305	1306	1307	1308
1309	1310	1311	1312	1313	1314
1315	1316	1317	1318	1319	1320
1321	1322	1323	1324	1325	1326
1327	1328	1329	1330	1331	1332
1333	1334	1335	1336	1337	1338
1339	1340	1341	1342	1343	1344
1345	1346	1347	1348	1349	1350
1351	1352	1353	1354	1355	1356
1357	1358	1359	1360	1361	1362
1363	1364	1365	1366	1367	1368

WATER SUPPLY INVENTORY
SALT RIVER VALLEY SYSTEM
MARCH 15, 1964

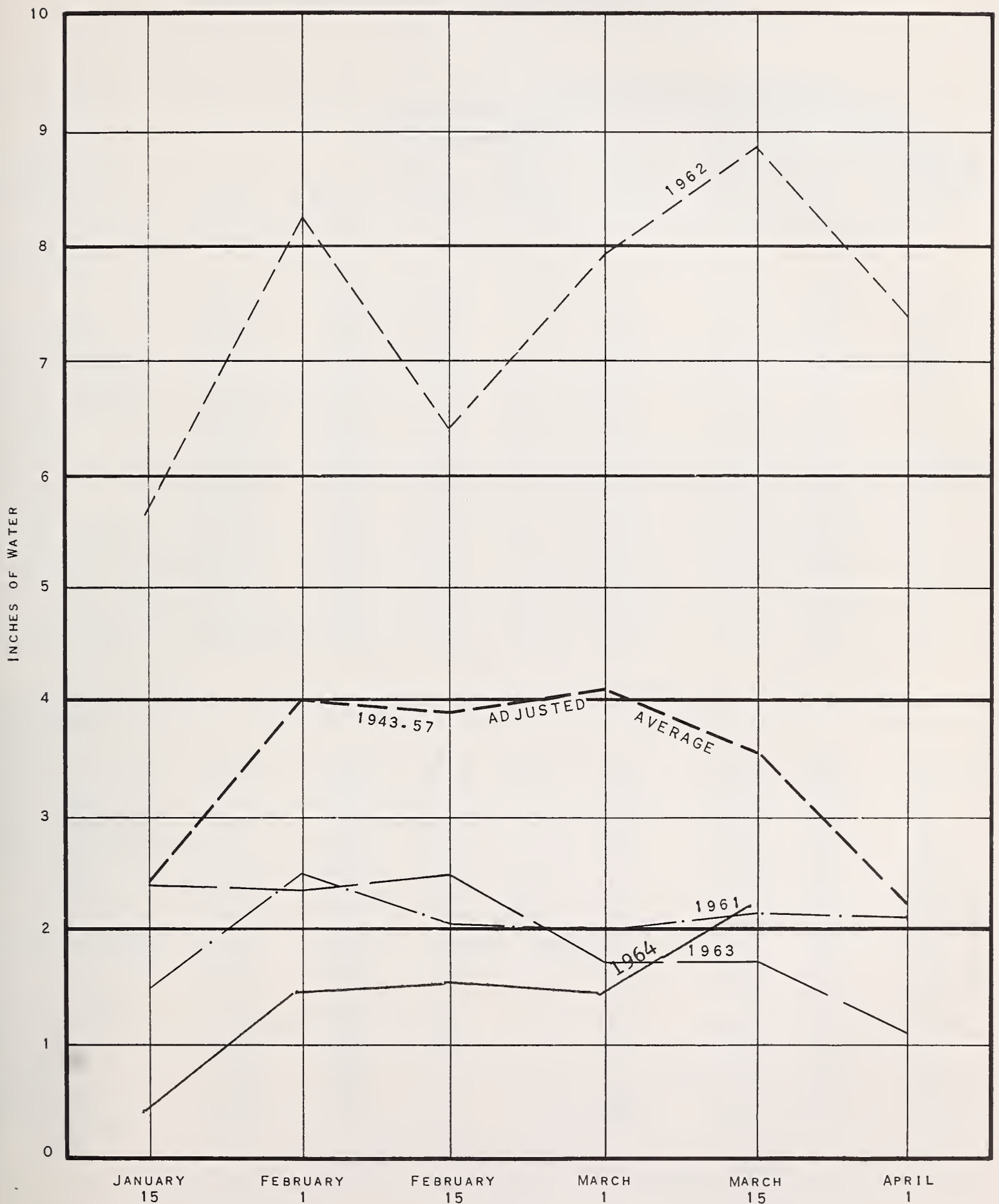


* Based on present Storage + Forecast Spring runoff + Average Summer runoff

RELATIVE SNOW WATER ACCUMULATION

ARIZONA

MARCH 15, 1964



This graph represents the average snow water content on eleven selected snow courses on Arizona Sub-Watersheds.

ADOLPH HORN

1895

ARIZONA SNOW SURVEYS - ABOUT MARCH 15, 1964

SUB-WATERSHED and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENTS					
			1964			PAST RECORD		
			Date of Survey	Snow Depth (In.)	Water Content (In.)	Water Content (Inches) 1943-57 Average		
						1963	1962	
<u>GILA RIVER</u>								
Bear Wallow	10T1	8100	3/15	8	2.1	1.8	14.8	1.6 **
Beaver Head	9S6	8000	3/11	4	1.3	0.5	6.4	1.9
Coronado Trail	9S7	8000	3/13	2	0.3	0.0	3.4	1.9
Frisco Divide	8S1-M	8000	3/13	4	1.1	0.3	2.7	1.2
Hummingbird <u>1/</u>	8S9-A	10550	3/12	48	10.5	---	---	---
Ice King	8S6	8020	3/11	18	3.7	7.1	11.8	---
Inman	7S2	7800	3/13	0	0.0	0.0	T	0.3 **
Mogollon	8S2	7000	3/11	1	0.2	1.7	3.2	1.2 **
Nutrioso	9S4	8500	3/13	3	0.7	0.0	2.8	1.2
Redstone Trail	8S7	8600	3/11	19	3.9	7.0	11.2	---
Rose Canyon	10T2	7300	3/15	4	0.9	0.0	8.1	0.5 **
Silver Creek Div.	8S8	9000	3/11	26	5.2	---	---	---
State Line	9S8	8000	3/13	1	0.1	T	2.2	1.4
Whitewater <u>1/</u>	8S10-A	10750	3/12	43	9.0	---	---	---
<u>SALT RIVER</u>								
Baldy *	9S1	9125	3/11	20	4.4	5.3	17.3	7.1 **
Beaver Head	9S6	8000	3/11	4	1.3	0.5	6.4	1.9
Canyon Creek #2	10R7-M	7500	3/12	11	3.4	0.0	7.7	---
Coronado Trail	9S7	8000	3/13	2	0.3	0.0	3.4	1.9
Forest Dale	10R6	6430	3/13	T	T	0.0	1.5	0.4
Ft. Apache *	9R5	9160	3/11	22	4.4	6.6	17.4	8.0 **
Gentry	10R5	7600	3/12	8	2.8	0.0	6.9	2.2 **
Hannagan Meadows	9S11	9090	Report	Delayed		---	---	---
Heber	10R4	7600	3/12	8	2.7	0.0	7.4	2.4 **
Maverick Fork	9S2	9050	3/11	20	4.7	5.9	20.2	9.4 **
McNary	9R2-M	7200	3/13	6	1.6	0.0	5.7	1.3
Milk Ranch	9R1	7000	3/13	2	0.5	0.0	2.4	0.6
Nutrioso *	9S4	8500	3/13	3	0.7	0.0	2.8	1.2
Pacheta	9S5	7800	3/15	0	0.0	0.0	8.0	2.0 **
Workman Creek	10S1	6900	3/11	11	4.1	0.8	16.1	2.8 **

* On Adjacent Drainage

** 1943-57 Adjusted Average

1/ Aerial observation: Water contents estimated.



ARIZONA SNOW SURVEYS - ABOUT MARCH 15, 1964

SUB-WATERSHED and SNOW COURSE			SNOW COVER MEASUREMENTS					
			1964			PAST RECORD		
			Date of Survey	Snow Depth (In.)	Water Content (In.)	Water Content (Inches) 1943-57 Average		
No.	Elev.					1963	1962	
<u>VERDE RIVER</u>								
Camp Wood	12R1	5700	3/12	4	0.6	0.0	0.0	0.5 **
Casner Park	11R2-M	6930	3/13	5	1.5	0.0	8.7	2.9 **
Chalender	12P1-M	7100	3/13	4	1.4	0.0	6.7	2.7 **
Copper Basin Div.	12R6	6720	3/13	1	0.2	0.0	---	---
Fort Valley	11P2	7350	3/13	3	0.7	0.0	7.1	1.9 **
Gaddes Canyon	12R4	7600	3/13	6	1.4	1.9	11.2	---
Happy Jack	11R5	7630	3/14	0	0.0	0.0	8.7	2.8 **
Iron Springs *	12R2	6200	3/14	0	0.0	0.0	1.6	0.6 **
Mingus Mountain	12R3	7100	3/13	0	0.0	0.0	1.4	0.7 **
Mormon Lake *	11R4	7350	3/13	9	2.7	T	9.5	4.3 **
Mormon Mountain	11R3-M	7500	3/13	9	2.9	0.5	12.1	6.5 **
Munds Park	11R1-M	6500	3/13	0	0.0	0.0	4.4	2.2 **
Newman Park	11P5-M	6750	3/13	2	0.8	0.0	---	---
Snow Bowl	11P4	10260	3/7	16	3.3	No Survey	18.4	---
White Spar	12R5	6000	3/13	0	0.0	0.0	---	---
<u>BILL WILLIAMS RIVER</u>								
Camp Wood *	12R1	5700	3/12	4	0.6	0.0	0.0	0.5 **
Copper Basin Div.	12R6	6720	3/13	1	0.2	0.0	---	---
Iron Springs	12R2	6200	3/14	0	0.0	0.0	1.6	0.6 **
Willow Ranch	13P1	5000	3/15	0	0.0	0.8	T	0.1 **
<u>LOWER COLORADO RIVER</u>								
Bright Angel	12N1	8400	3/11	21	5.2	No Survey		10.4 **
Chalender *	12P1-M	7100	3/13	4	1.4	0.0	6.7	2.7 **
Fort Valley	11P2	7350	3/13	3	0.7	0.0	7.1	1.9 **
Grand Canyon	11P1	7500	3/13	5	0.9	0.0	4.0	1.6 **
<u>LITTLE COLORADO RIVER</u>								
Baldy	9S1	9125	3/11	20	4.4	5.3	17.3	7.1 **
Canyon Creek #2	10R7-M	7500	3/12	11	3.4	0.0	7.7	---
Forest Dale	10R6	6430	3/13	T	T	0.0	1.5	0.4
Ft. Apache	9R5	9160	3/11	22	4.4	6.6	17.4	8.0 **
Fort Valley	11P2	7350	3/13	3	0.7	0.0	7.1	1.9 **
Gentry	10R5	7600	3/12	8	2.8	0.0	6.9	2.2 **
Happy Jack *	11R5	7630	3/14	0	0.0	0.0	8.7	2.8 **
Heber	10R4	7600	3/12	8	2.7	0.0	7.4	2.4 **
McNary	9R2-M	7200	3/13	6	1.6	0.0	5.7	1.3
Mormon Lake	11R4	7350	3/13	9	2.7	T	9.5	4.3 **
Mormon Mountain	11R3-M	7500	3/13	9	2.9	0.5	12.1	6.5 **
Nutrioso	9S4	8500	3/13	3	0.7	0.0	2.8	1.2
Snow Bowl	11P4	10260	3/7	16	3.3	No Survey	18.4	---

* On Adjacent Drainage

** 1943-57 Adjusted Average



PRECIPITATION AT SELECTED ARIZONA STATIONS *

STATION	Precipitation (Inches)			
	February - 1964		Current Water-Year (Oct. 1963 - Feb. 1964)	
	Total	Departure from Normal	Total	Departure from Normal
Alpine	1.12	- .26	5.81	- .97
Ash Fork	0	-1.15	4.03	- .74
Clifton	0	- .91	2.30	-1.98
Douglas Smelter	.05	- .54	1.88	-1.20
Flagstaff WBAS **	.14	-1.64	4.21	-3.57
Payson Ranger Station	.19	-2.00	6.68	-2.38
Phoenix WBAS	.01	- .84	2.42	- .96
Prescott WBAS	.07	-1.01	2.38	-1.94
Springerville	.44	- .09	2.08	- .89
Tucson WBAS	.13	- .71	2.21	-1.63
Winslow WBAS	.14	- .34	1.89	- .56
Yuma WBAS	.14	- .22	1.25	- .32

** WBAS = Weather Bureau Airport Station

* Data and Analysis furnished by Paul C. Kangieser,
Arizona State Climatologist, U. S. Weather Bureau,
Phoenix, Arizona.

ARIZONA SOIL MOISTURE - ABOUT MARCH 15, 1964

Drainage Basin and Station	<u>1/</u> Station Number	Elev.	Soil Profile in Inches		Date	Soil Moisture Content in Inches--about MAR. 15			
			Depth	Cap.		1964	1963	1962	Avg.

GILA RIVER

Frisko Divide	8S1-M	8000	48	13.3	3/13	6.0	11.7	13.2	12.2
---------------	-------	------	----	------	------	-----	------	------	------

SALT RIVER

Black River Divide	9S10-*	9100	48	16.8	3/11	10.6**	11.6	12.3	11.7
Canyon Creek #2	10R7-M	7500	48	18.3	3/12	13.2	13.2	13.2	13.0
Corduroy Creek	10R8-*	6000	48	16.0	3/10	7.0	10.5	11.4	9.3
McNary	9R2-M	7200	48	16.3	3/10	6.9	11.4	8.7	9.5

VERDE RIVER

Casner Park	11R2-M	6930	48	19.1	3/13	10.0**	18.7	13.8	15.4
Mormon Mountain	11R3-M	7500	48	16.1	3/13	8.9**	14.2	11.6	10.8

1/ * - Soil Moisture Station only
M - Snow Course and Soil Moisture Station

** - First foot estimated - ground frozen.

RECEIVED

10

LIST OF SNOW SURVEYORS

SNOW COURSE

SURVEYOR

Baldy -----	SCS and SRVWUA
Bear Wallow -----	Forest Service - Allan Hinds
Beaver Head -----	N. A. Josh
Bright Angel -----	National Park Service - Vern Ruesch
Camp Wood -----	Lyn Pehl
Canyon Creek #2 -----	SCS and SRVWUA
Casner Park -----	SCS and SRVWUA
Chalender -----	Forest Service - Mel Richards
Copper Basin Divide ---	SCS - Bill Gray
Coronado Trail -----	Forest Service - R.P. Julander & W.L. Sanders
Forest Dale -----	Fort Apache Reservation - Boyer & Endfield
Ft. Apache -----	SCS and SRVWUA
Fort Valley -----	Rocky Mountain Forest & Range Experiment Station
Frisco Divide -----	Forest Service - Joe Clayton
Gaddes Canyon -----	SCS - Bill Gray
Gentry -----	SCS and SRVWUA
Grand Canyon -----	National Park Service - Paul Mathis
Hannagan Meadows -----	N. A. Josh
Happy Jack -----	Emil O. Ryberg
Heber -----	SCS and SRVWUA
Hummingbird -----	Ray Freeman
Ice King -----	James R. Wray
Inman -----	C. H. McCauley
Iron Springs -----	Ernest Saxby
Maverick Fork -----	SCS and SRVWUA
McNary -----	Fort Apache Reservation - Boyer & Endfield
Milk Ranch-----	Fort Apache Reservation - Boyer & Endfield
Mingus Mountain -----	SCS - Bill Gray
Mogollon -----	James R. Wray
Mormon Lake -----	SCS and SRVWUA
Mormon Mountain -----	SCS and SRVWUA
Munds Park-----	SCS and SRVWUA
Newman Park -----	SCS and SRVWUA
Nutriso -----	Forest Service - R.P. Julander & W.L. Sanders
Pacheta-----	Foch Phillips
Redstone Trail -----	James R. Wray
Rose Canyon -----	Forest Service - Allan Hinds
Silver Creek Divide ---	James R. Wray
Snow Bowl -----	Forest Service - Jay Shoemaker
State Line -----	Forest Service - Joe Clayton
White Spar-----	SCS - Bill Gray
Whitewater -----	Ray Freeman
Willow Ranch -----	Tiny Miller
Workman Creek -----	Rocky Mountain Forest & Range Experiment Station

The Following Organizations Cooperate in the Arizona Snow Survey Work

FEDERAL

Department of Agriculture

Soil Conservation Service

Forest Service

Apache Forest

Coconino Forest

Coronado Forest

Gila Forest

Kaibab Forest

Prescott Forest

Rocky Mountain Forest and Range Experiment Station

Tonto Forest

Department of Commerce

Weather Bureau

Arizona Section

Department of Interior

Bureau of Reclamation

Region III

Geological Survey

Arizona District

Bureau of Indian Affairs

Fort Apache Reservation

San Carlos Irrigation Project

National Park Service

Grand Canyon National Park

Gila Water Commissioner

Safford, Arizona

STATE

Arizona Agricultural Experiment Station

IRRIGATION PROJECTS

Salt River Valley Water Users' Association

Phoenix, Arizona

San Carlos Irrigation and Drainage District

Coolidge, Arizona

PRIVATE

Southwest Forest Industries, Inc.

McNary, Arizona

Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

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